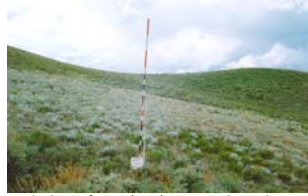
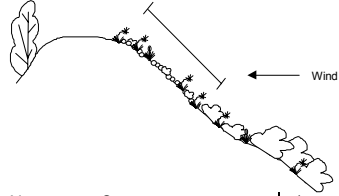


## F. NON-RIPARIAN GRASSLANDS (GA)

### GA01. INDIAN RICEGRASS/NEEDLE-AND-THREAD-ARIDIC SOILS-WINDSWEPT RIDGE

**SHOULDERS** (ACHY/HECO26-CHGR15). Indian ricegrass/needle-and-thread-blue grama-Moderately deep to shallow Aridic Mesic soils, gravelly surface-Convex windward summits and shoulders, >9,000 ft



NUMBER OF SAMPLES	15, soil descriptions from 15; 1 not assigned to a CT (total 16)
ELEVATION	8,526 ft (7,680-9,370 ft); 2,598 m (2,341-2,856 m)
AVERAGE ASPECT	252°M (r = 0.47)
LITHOLOGY	Tuffs [45%], Granite [7%], and Breccias [7%] predominate, some sedimentaries
FORMATIONS¹	Taf-Tpl [63%], Kdb-KJdm [21%], Xg-Xfh [21%]
LANDFORMS	Soil creep slopes [41%], Mesas and ridges [47%]
SLOPE POSITIONS	Mostly summits, shoulders, and upper backslopes [89%]
SLOPE SHAPES	Convex [75%] to linear [25%] horizontally, Mostly linear [75%] vertically
SLOPE ANGLE	16.0% (1-44%)
SOIL PARENT MATERIAL	Residuum [38%] or colluvium [31%]
COARSE FRAGMENTS	46.7% (0-73%) cover on surface, 58.8% (27-93%) by volume in soil
SOIL DEPTH	53 cm (26-100 cm); 20.9 in (10-39 in)
MOLLIC THICKNESS	17 cm (0-37 cm); 6.5 in (0-15 in)
TEXTURE	Mostly loamy (clay loam-loam-sandy loam [79%]) on the surface; subsurfaces are clayey to loamy, with clay-sandy clay [44%] or loam-sandy loam-sandy clay loam [39%]. Surfaces are usually very gravelly or gravelly, often cobbly or very cobbly as well.
SOIL CLASSIFICATION	Aridic Argiborolls [67%] or Lithic Haploborolls [20%]
TOTAL LIVE COVER	93.8% (52.4-167.2%)
NUMBER OF SPECIES	28.0 (21-37)
TOTAL LIVE COVER/NO. SPECIES	3.5% (1.5-5.7%)
CLIMATE	Hot in the summer, very cold in the winter, very dry (Aridic) Submontane. Evaporation from the surface (which is composed largely of coarse fragments) is significant because of the constant wind.
WATER	Precipitation is moderately low, but since the wind blows here nearly year-long, very little of that precipitation is available for plant growth. Soil is dry almost year-long.

#### Key to Community Types

1. Winterfat (KRLA2) evident, >5% ..... (2)
1. Winterfat absent or <5%, usually <2% ..... (3)
2. Western wheatgrass (PASM) conspicuous, >15%. Total graminoid cover >85% ..... **B**
2. Western wheatgrass absent or minor, usually <10%. Total graminoid cover <80% ..... **D**
3. Needle-and-thread (HECO26) usually dominant, >10% cover, often >25%. Pine needlegrass (ACPI2) absent or <10%. Snakeweed (GUSA2) absent to <1% cover ..... (4)
3. Needle-and-thread minor, <10% cover. Pine needlegrass always present, >10% cover. Snakeweed present, >2% cover ..... **C**
4. Total graminoid cover >85%. Total live cover >95% ..... **A**
4. Total graminoid cover <75%. Total live cover <95% ..... **D**

#### Description of Community Types

- A** *Needle-and-thread-sedge-Sandberg bluegrass-sparse Indian ricegrass* is dominated by needle-and-thread, >35% cover, with conspicuous needleleaf sedge (CASTE3), bottlebrush squirreltail (ELEL5), and Sandberg bluegrass (POSE). Indian ricegrass is always present, but in small quantities, <5% cover. Shrubs are all minor, including green rabbitbrush (CHVIP5),

up to 5% cover. Total graminoid cover is >85%, and graminoid production is >1,200 lb/ac/yr.

- B** *Needle-and-thread-winterfat-western wheatgrass* has conspicuous western wheatgrass (PASM), >15% cover, but is dominated by either blue grama (CHGR15) or needle-and-thread. Winterfat (KRLA2) is the only conspicuous shrub, >5% cover. Total graminoid cover is >90%, and graminoid production is >1,200 lb/ac/yr.
- C** *Snakeweed-pine needlegrass-needle-and-thread-blue grama* is dominated by snakeweed (>2% cover) and pine needlegrass (>15% cover). Pingue (PIRI6) and Indian ricegrass are also constant. Total graminoid cover is 30-60%, and graminoid production is 200-700 lb/ac/yr.
- D** *Needle-and-thread-sparse* is dominated by needle-and-thread, >10% cover, often >25%. Blue grama is sometimes codominant, 0-25% cover. Total graminoid cover is 20-70%, and graminoid production is 100-900 lb/ac/yr.

#### Communities Not Assigned to a Community Type

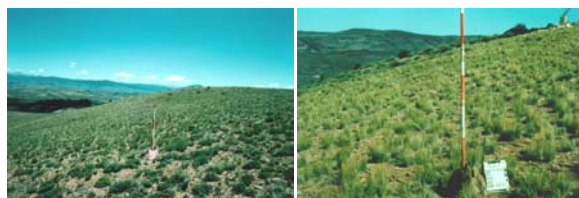
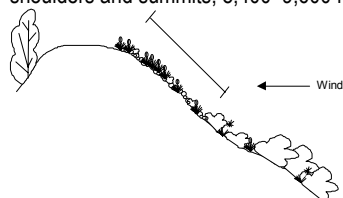
- A community dominated by Indian ricegrass (ACHY), with very little else, other species mostly <10% cover each. I would call this the PNC, except for the very low total live cover, indicating that the site has been depleted in some strange way.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Gramin. Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Indian ricegrass-bottlebrush	8,440 (8,209-8,782) 27.0 (24-29)	65 72 0	54 (35-74) 21 (8-34) LS	0 (0-0) 11 (1-24) 49 (36-61) 7 (2-10)	23 (19-27) 66 (45-94) 3.0 (2.2-4.3)	12-480 255-782 24-112
B. Needle-and-thread-sedge-bluegrass-sparse Indian ricegrass	7,996 (7,680-8,520) 9.7 (2-17)	56 (27-77) 55 (32-100) 15 (0-28)	57 (22-71) 4 (1-7) LM	0 (0-0) 1 (1-2) 110 (91-119) 20 (4-47)	29 (21-35) 130 (95-167) 4.6 (3.5-5.7)	11-37 1228-1330 44-337
C. Needle-and-thread-winterfat-western wheatgrass	8,585 (8,210-8,960) 4.0 (1-7)	53 (31-74) 79 (68-90) 32 (27-37)	48 (23-73) 9 (1-17) MS	0 (0-0) 9 (7-12) 104 (94-115) 11 (10-13)	24 (22-25) 125 (116-135) 5.3 (5.3-5.4)	140-238 1254-1327 105-143
D. Snakeweed-pine needlegrass-needle-and-thread-blue grama	8,663 (8,640-8,700) 39.9 (32-44)	61 (46-92) 52 (40-75) 10 (0-30)	53 (47-61) 19 (14-25) EM	0 (0-0) 16 (13-21) 45 (38-52) 5 (1-12)	29 (22-35) 66 (52-86) 2.3 (1.7-2.7)	269-435 277-594 12-133
E. Needle-and-thread-sparse	8,790 (8,170-9,370) 12.2 (5-35)	62 (40-93) 44 (26-56) 16 (2-29)	44 (7-72) 16 (2-41) EM	0 (0-0) 5 (0-9) 46 (24-65) 22 (12-36)	29 (22-37) 73 (55-93) 2.7 (1.5-3.8)	0-184 107-874 127-333

	SHRUBS	
KRLA2	Krascheninnikovia lanata	common winterfat
SYRO	Symphoricarpos rotundifolius	mountain snowberry
	GRAMINOIDS	
ACHY	Achnatherum hymenoides	Indian ricegrass
ACNE9	Achnatherum nelsonii	Nelson's needlegrass
ACPI2	Achnatherum pinetorum	pine needlegrass
ANTE6	Anisantha tectorum	cheatgrass
CASTE3	Carex stenophylla ssp. eleocharis	needleleaf sedge
CHGR15	Chondrosium gracile	blue grama
ELEL5	Elymus elymoides	bottlebrush squirreltail
FESA	Festuca saximontana	Rocky Mountain fescue
HECO26	Hesperostipa comata	needle-and-thread

	GRAMINOIDS (Cont.)	
KOMA	Koeleria macrantha	prairie junegrass
MUMO	Muhlenbergia montana	mountain muhly
PASM	Pascopyrum smithii	western wheatgrass
POFE	Poa fendleriana	muttongrass
POSE	Poa secunda	Sandberg bluegrass
	FORBS	
ANSE4	Androsace septentrionalis	northern rock-jasmine
ARFR4	Artemisia frigida	fringed sagewort
ERLO4	Eriogonum lonchophyllum	spearleaf buckwheat
GADI2	Gayophytum diffusum	spreading ground smoke
HAFL2	Hackelia floribunda	many-flowered stickseed
HYFI	Hymenopappus filifolius	white ragweed
PASE	Paronychia sessiliflora	creeping nailwort
PHHO	Phlox hoodii	Hood's phlox

GA02. **ARIZONA FESCUE/PINGUE–SHALLOW–WINDWARD SLOPES** (FEAR2/PIRI6). Arizona fescue/pingue–Moderately deep to shallow residual Argiborolls, gravelly surface–Linear to convex exposed shoulders and summits, 8,400–9,600 ft



NUMBER OF SAMPLES	18, soil descriptions from 14 of these (total 18)
ELEVATION	9,046 ft (8,420-9,520 ft); 2,757 m (2,566-2,902 m)
AVERAGE ASPECT	267°M (r = 0.86)
LITHOLOGY	Tuffs [68%], breccia [14%], and granite [9%]
FORMATIONS¹	Taf-Tpl [84%], Xg [11%]
LANDFORMS	Mostly mesas and ridges [71%], some soil creep slopes [24%]
SLOPE POSITIONS	Mostly shoulders-summits [71%] and upper backslopes [10%]
SLOPE SHAPES	Linear [71%] to convex [29%] horizontally, Convex [53%] to linear [29%] vertically
SLOPE ANGLE	20.8% (8-34%)
SOIL PARENT MATERIAL	Residuum [65%] or colluvium [29%]
COARSE FRAGMENTS	57.8% (24-77%) cover on surface, 69.5% (36-87%) by volume in soil
SOIL DEPTH	64 cm (26-162 cm); 25.4 in (10-64 in)
MOLLIC THICKNESS	20 cm (7-40 cm); 7.8 in (3-16 in)
TEXTURE	Surface is clearly loamy, with loam and silty loam leading; subsurface is clayey (sandy clay loam-clay-clay loam [63%]) to loamy (sandy loam-silty clay loam [21%])
SOIL CLASSIFICATION	Mostly Argiborolls [88%] of various kinds; moderately deep [57%] to shallow [21%]
TOTAL LIVE COVER	72.9% (50.8-140.9%)
NUMBER OF SPECIES	30.0 (22-39)
TOTAL LIVE COVER/NO. SPECIES	2.5% (1.6-4.1%)
CLIMATE	Hot in the summer, very cold in the winter, very dry (Aridic) Submontane. Evaporation from the surface (which is composed largely of coarse fragments) is significant because of the constant wind.
WATER	Precipitation is moderately low, but since the wind blows here nearly year-long, very little of that precipitation is available for plant growth. Soil is dry almost year-long.

#### Key to Community Types

1. Arizona fescue >30% cover ..... **A**
1. Arizona fescue <30% cover ..... (2)
2. Arizona fescue 20-30% cover ..... **B**
2. Arizona fescue <20% cover ..... (3)
3. Dominated by blue grama (CHGR15) or needle-and-thread (HECO26). Arizona fescue T-10%. Total live cover >75% ..... **C**
3. Both blue grama and needle-and-thread secondary to Arizona fescue (5-25% cover). Total live cover <75% ..... **D**

# Description of Community Types

- A** *Arizona fescue-pingue-needle-and-thread* has Arizona fescue dominant, >30% cover. Other graminoids, forbs, and shrubs are sparse. Total graminoid cover is 35-55%.
- B** *Arizona fescue-junegrass-pingue* has Arizona fescue dominant, 20-30% cover. Total graminoid cover is 35-60%.
- C** *Blue grama-sedge-needle-and-thread-sparse Arizona fescue* is dominated by blue grama, 0-30% cover, or needle-and-thread, 0-35% cover. Arizona fescue is always present but subordinate, <10% cover. Total graminoid cover is 30-75%.
- D** *Arizona fescue-sparse* has Arizona fescue the leading plant species, 5-20% cover. Other species are usually minor, <5% cover, except sometimes Sandberg bluegrass may be >10% cover. Total graminoid cover is 15-40%.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Serai Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Arizona fescue-pingue-needle-and-thread	8,940 (8,610-9,430) 20.0 (16-23)	77 (74-81) 47 (40-53) 18 (13-22)	65 (51-75) 3 (1-7) LS	0 (0-0) 4 (0-11) 45 (40-50) 12 (5-20)	27 (25-30) 62 (51-74) 2.4 (1.7-2.9)	0-230 324-562 55-213
B. Arizona fescue-junegrass-pingue	9,178 (8,860-9,360) 20.5 (10-29)	72 (57-82) 79 (42-157) 18 (7-25)	60 (53-77) 8 (4-17) LM	0 (0-0) 10 (6-15) 43 (35-55) 13 (7-19)	32 (25-36) 65 (55-78) 2.1 (1.6-2.7)	124-300 234-656 71-209
C. Blue grama-sedge-needle-and-thread-sparse Arizona fescue	9,045 (8,860-9,370) 20.3 (9-28)	63 (36-86) 69 (41-162) 25 (15-40)	50 (24-72) 5 (2-8) MS	0 (0-0) 10 (2-21) 53 (35-73) 32 (10-67)	29 (22-39) 95 (83-141) 3.3 (2.8-4.1)	35-422 220-1016 110-345
D. Arizona fescue-fringed sage-sparse	8,905 (8,420-9,520) 18.7 (6-34)	69 (47-87) 50 (26-87) 17 (7-26)	62 (47-69) 12 (5-19) EM	0 (0-0) 7 (2-16) 24 (18-36) 21 (10-33)	32 (29-34) 53 (44-63) 1.6 (1.4-1.9)	30-334 78-254 111-330

	SHRUBS	
CHPA13	Chrysothamnus parryi	Parry rabbitbrush
CHVI8	Chrysothamnus viscidiflorus	Douglas rabbitbrush
	GRAMINOIDS	
ACPI2	Achnatherum pinetorum	pine needlegrass
CAFI	Carex filifolia	threadleaf sedge
CAFO3	Carex foenea	silvertop sedge
CASTE3	Carex stenophylla ssp. eleocharis	needleleaf sedge
CHGR15	Chondrosum gracile	blue grama
FEAR2	Festuca arizonica	Arizona fescue
HECO26	Hesperostipa comata	needle-and-thread
KOMA	Koeleria macrantha	prairie junegrass
POSE	Poa secunda	Sandberg bluegrass
	FORBS	
ANPA4	Antennaria parvifolia	smallleaf pussytoes
ARFR4	Artemisia frigida	fringed sagewort
ERCO27	Erigeron concinnus	Navajo fleabane
ERRA3	Eriogonum racemosum	redroot buckwheat
HYFI	Hymenopappus filifolius	white ragweed
LESU3	Lepidotheca suaveolens	pineapple weed
MINU	Microseris nutans	nodding microseris
PHMU3	Phlox multiflora	flowery phlox
PUPA5	Pulsatilla patens	American pasque flower
SEDE2	Selaginella densa	little club-moss
TEAC	Tetraneuris acaulis	stemless hymenoxys
TETO	Tetraneuris torreyana	Torrey's hymenoxys

GA03. **ARIZONA FESCUE/MUHLY-DEEP-WINDWARD SLOPES** (FEAR2/MUMO-MUFI). Arizona fescue/muhly-Shallow to deep colluvial Argiborolls, sometimes Lithic, gravelly surface-Linear to convex somewhat protected slopes, 8,700-10,500 ft



NUMBER OF SAMPLES	20, soil descriptions from 11; 2 not assigned to a CT (total 22)
ELEVATION	9,669 ft (8,760-10,480 ft); 2,947 m (2,670-3,194 m)
AVERAGE ASPECT	166°M (r = 0.54)
LITHOLOGY	Igneous, for example tuff and welded tuff [58%], breccia-basalt-rhyolite [33%]; so far no sedimentary
FORMATIONS¹	Taf [64%], Tpl-Tbb-Tiql [32%]
LANDFORMS	Soil creep slopes [78%], benches and ridges [17%]
SLOPE POSITIONS	Primarily backslopes, footslopes, and toeslopes [90%]
SLOPE SHAPES	Linear [61%] to convex [33%] horizontally, Linear [67%] to concave [28%] vertically
SLOPE ANGLE	25.1% (6-111%)
SOIL PARENT MATERIAL	Mostly colluvium [72%]
COARSE FRAGMENTS	30.0% (5-71%) cover on surface, 53.6% (14-79%) by volume in soil
SOIL DEPTH	54 cm (20-95 cm); 21.4 in (8-37 in)
MOLLIC THICKNESS	22 cm (0-52 cm); 8.6 in (0-20 in)
TEXTURE	Surface is clay loam (silty clay loam-sandy clay loam-clay loam [64%] Subsurface is mixed, often clay-sandy clay loam-sandy clay [76%]
SOIL CLASSIFICATION	Argiborolls primarily [63%], and some Haploborolls [44%]; more Lithic soils than usual [38%]
TOTAL LIVE COVER	88.1% (29.4-166.9%)
NUMBER OF SPECIES	26.7 (17-38)
TOTAL LIVE COVER/NO. SPECIES	3.4% (1.1-5.6%)
CLIMATE	In deep rainshadow. Warm, exposed to sun, somewhat exposed to wind. Hot in the summer, very cold in the winter, very dry (Aridic) Submontane. Evaporation from the surface (which is composed largely of coarse fragments) is significant because of the constant wind.
WATER	Dry microclimate, but vegetation cover and coarse fragments hold some moisture through the season on better-condition sites. No permanent water on or near sites. Precipitation is moderately low, but since the wind blows here nearly year-long, very little of that precipitation is available for plant growth. Soil is dry almost year-long.

#### Key to Community Types

1. Parry oatgrass conspicuous, >10% cover, often >25% ..... **A**
1. Parry oatgrass absent or <10% ..... (2)
2. Total graminoid cover <30%. Arizona fescue <10%, usually <2% cover. Parry oatgrass absent ..... **D**
2. Total graminoid cover >30%. Arizona fescue usually >5% cover. Parry oatgrass usually present, 0-10% cover ..... (3)
3. Arizona fescue >13% cover, usually >20%..... **B**
3. Arizona fescue <13% cover, usually <10% ..... **C**

# Description of Community Types

- A** *Parry oatgrass-mountain muhly-Arizona fescue* Parry oatgrass is dominant with >30% cover. Arizona fescue (5-15% cover), and one of the muhlies (5-40% cover) are always present. Total graminoid cover is high, >65%.
- B** *Arizona fescue-muhly* Arizona fescue is dominant with >13%. Sometimes one of the muhlies is codominant. Parry oatgrass is usually present but subordinate, with 0-10% cover. Total graminoid cover is moderately high, 50-85%.
- C** *Muhly-Arizona fescue* is dominated by one or both of the muhlies with 20-60% cover. Arizona fescue is always present at 0-15% cover. Parry oatgrass is usually absent, but sometimes as much as 5% cover. Total graminoid cover is moderately high, 50-80%.
- D** *Muhly-sparse* One of the muhlies is always present at 5 to 30%. Arizona fescue is always present in small amounts, T-5% cover. Other graminoids are sparse. Total graminoid cover is low, <30%.

## Communities Not Assigned to a Community Type

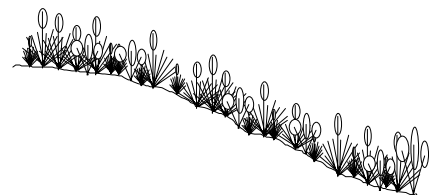
- One community is dominated by Parry oatgrass, with Arizona fescue a significant subdominant, but lacks muhly (neither mountain nor slimstem). Total graminoid cover is high, >100%. This community would fit CT A except for the lack of muhly.
- One community is dominated by muttongrass (POFE) and Rocky Mountain fescue (FESA), but lacks muhly. Total graminoid cover is high, >100%. Rocky Mountain fescue tends to replace Arizona fescue in other community types, and this site seems to be roughly in the same range as other community types. This site may represent another, uncommon ET.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Parry oatgrass-mountain muhly-Arizona fescue	9,840 (9,440- 10,480) 19.1 (8-32)	64 (57-71) 65 (48-88) 21 (0-52)	17 (6-30) 18 (1-35) PN	0 (0-0) 4 (0-10) 83 (67-117) 22 (13-50)	28 (24-31) 109 (85-167) 3.9 (3.3-5.6)	0-205 905-1329 182-338
B. Arizona fescue-muhly	9,897 (9,080- 10,400) 39.5 (11-111)	55 (30-68) 51 (30-76) 26 (10-40)	32 (14-58) 30 (18-65) LS	0 (0-0) 5 (0-9) 66 (51-83) 23 (12-33)	29 (22-38) 93 (68-112) 3.3 (2.6-4.1)	3-187 580-1154 176-330
C. Muhly-Arizona fescue	9,502 (9,120- 10,410) 24.5 (7-63)	46 (14-79) 59 (20-95) 18 (2-36)	36 (10-62) 27 (6-55) LM	0 (0-0) 8 (0-16) 57 (51-76) 16 (3-37)	27 (18-35) 81 (69-99) 3.2 (2.3-4.7)	8-324 567-1058 38-334
D. Muhly-sparse	9,320 (8,760-9,640) 11.8 (6-22)	45 (28-63) 32 (20-43) 21 (16-26)	37 (5-71) 54 (15-90) EM-MS	0 (0-0) 13 (0-41) 21 (15-26) 29 (14-54)	22 (17-26) 62 (29-90) 3.1 (1.1-4.6)	9-678 64-115 207-338

	SHRUBS	
PIRI6	<i>Picradenia richardsonii</i>	pinque
	GRAMINOIDS	
CHGR15	<i>Chondrosom gracile</i>	blue grama
DAPA2	<i>Danthonia parryi</i>	Parry oatgrass
FEAR2	<i>Festuca arizonica</i>	Arizona fescue
FESA	<i>Festuca saximontana</i>	Rocky Mountain fescue
KOMA	<i>Koeleria macrantha</i>	prairie junegrass
MUF1	<i>Muhlenbergia filiculmis</i>	slimstem muhly
MUMO	<i>Muhlenbergia montana</i>	mountain muhly
POFE	<i>Poa fendleriana</i>	muttongrass
GRAM1	graminoid unknown	unknown graminoid

	FORBS	
AMLA6	<i>Amerosedum lanceolatum</i>	yellow stonecrop
ARFR4	<i>Artemisia frigida</i>	fringed sagewort
ERFE3	<i>Eremogone fendleri</i>	desert sandwort
ERFL	<i>Erigeron flagellaris</i>	trailing fleabane
ERSU2	<i>Erigeron subtriniservis</i>	threenerve fleabane
HEVI4	<i>Heterotheca villosa</i>	hairy golden aster
POHI6	<i>Potentilla hippiana</i>	horse cinquefoil
POPU9	<i>Potentilla pulcherrima</i>	beauty cinquefoil
SEDE2	<i>Selaginella densa</i>	little club-moss
TAOF	<i>Taraxacum officinale</i>	common dandelion

GA04. **THURBER-ARIZONA FESCUES—DEEP COLD DARK SOILS** (FETH/FEAR2). Thurber fescue/Arizona fescue—Deep Argic Cryoborolls, not coarse on surface—Linear protected footslopes and toeslopes, 9,200-10,800 ft



NUMBER OF SAMPLES	12, soil descriptions from 8 of these (total 12)
ELEVATION	10,072 ft (9,210-10,800 ft); 3,070 m (2,807-3,292 m)
AVERAGE ASPECT	133°M (r = 0.83)
LITHOLOGY	Mostly tuffs [64%], a variety of others
FORMATIONS†	Taf [77%], a variety of others
LANDFORMS	Soil creep slopes [85%]
SLOPE POSITIONS	Footslopes, toeslopes, and lower backslopes [93%]
SLOPE SHAPES	Linear [83%] horizontally, Concave [58%] to linear [25%] vertically
SLOPE ANGLE	17.3% (4-49%)
SOIL PARENT MATERIAL	Colluvial [92%]
COARSE FRAGMENTS	4.0% (1-19%) cover on surface, 50.2% (19-85%) by volume in soil
SOIL DEPTH	69 cm (46-87 cm); 27.2 in (18-34 in)
MOLLIC THICKNESS	37 cm (13-65 cm); 14.5 in (5-26 in)
TEXTURE	Mostly loam surface (loam-clay loam-sandy loam [70%]), Subsurface mostly clayey (sandy clay loam-clay-sandy clay-clay [75%])
SOIL CLASSIFICATION	All Cryoborolls, 90% Argic; All deep
TOTAL LIVE COVER	158.7% (105.8-201.4%).
NUMBER OF SPECIES	24.9 (20-36)
TOTAL LIVE COVER/NO. SPECIES	6.5% (4.6-9.5%)
CLIMATE	Outside rainshadow to in partial or deep rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine grassland.
WATER	The sites get significant snowfall. Much moisture is retained in the usually heavy layers of live vegetation and in the considerable litter layers. These sites may sometimes be adjacent to riparian areas.

#### Key to Community Types

1. Parry oatgrass >35% cover ..... **A**
1. Parry oatgrass absent or <35% cover ..... (2)
2. Sedges sometimes absent, total sedge cover 0-10%. Parry oatgrass sometimes absent, 0-20% cover. Mountain muhly (mumo) usually absent or <1% cover ..... **C**
2. Total sedge cover >10%. Parry oatgrass always present, 5-40% cover. Mountain muhly always present, T-25% cover ..... (3)
3. Thurber fescue >40% cover. Arizona fescue <12% cover ..... **B**
3. Thurber fescue <40% cover, often <20%. Arizona fescue >12% cover, often >15% ..... **D**

#### Description of Community Types

- A** *Thurber fescue-Parry oatgrass-sedge* is dominated by Thurber fescue at >60% cover, with Parry oatgrass conspicuous at >35% cover. Arizona fescue and mountain muhly are both present but inconspicuous, <10% cover each. Total sedge cover is >15%.

- B** *Thurber fescue-Parry oatgrass-Arizona fescue* is dominated by Thurber fescue at >65% cover, with Arizona fescue and Parry oatgrass both conspicuous at >10% cover each. Total sedge cover is >10%.
- C** *Thurber fescue-Arizona fescue* is dominated by Thurber fescue at 10-95% cover, or by Arizona fescue at 5-50% cover. Parry oatgrass is usually absent, but sometimes occurs up to 15% cover. Mountain muhly is absent. Sedges are absent or minor; total sedge cover is <10%.
- D** *Parry oatgrass-Arizona fescue-blunt sedge-Thurber fescue* is dominated by a mixture of Arizona fescue at 10-55% cover and Parry oatgrass at 5-40% cover. Thurber fescue is less prominent, with Trace to 20% cover. Mountain muhly and sedges are always present, 5-25% cover each.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Thurber fescue-Parry oatgrass-sedge-Arizona fescue	10,420 24.0 (19-29)	28 (19-37) 69 (69-69) 20 (20-20)	3 (2-4) 1 (1-1) PN	0 (0-0) 2 (2-2) 144 (142-147) 25 (15-35)	25 (23-27) 172 (159-184) 6.9 (6.8-6.9)	44-49 3054-3056 36-214
B. Thurber fescue-Parry oatgrass-Arizona fescue	10,105 (10,080-10,130) 8.0 (4-12)	62 (38-85) 67 (53-81) 36 (29-43)	1 (1-1) 0 (0-1) LS	0 (0-0) 1 (0-2) 142 (131-153) 26 (25-27)	22 (20-24) 169 (160-178) 7.8 (6.7-8.9)	0-47 3026-3051 90-113
C. Thurber fescue- Arizona fescue	9,673 (9,210-9,900) 20.8 (5-49)	56 (53-59) 76 (73-78) 62 (59-65)	3 (1-5) 18 (7-30) MS	0 (0-0) 6 (0-11) 101 (80-116) 31 (8-64)	21 (20-23) 138 (106-190) 6.7 (4.6-9.5)	0-241 2168-2923 20-705
D. Parry oatgrass- Arizona fescue-blunt sedge-Thurber fescue	10,281 (10,080-10,800) 15.0 (8-28)	53 (44-74) 67 (46-87) 33 (13-55)	8 (2-19) 8 (2-12) MS-LM	0 (0-0) 3 (0-7) 117 (96-151) 48 (22-83)	30 (24-36) 168 (118-201) 5.5 (4.9-5.8)	0-169 2596-3054 66-999

\*. Unknown: measurements were not taken in this CT.

	SHRUBS	
CHPA13	Chrysothamnus parryi	Parry rabbitbrush
	GRAMINOIDS	
ACNE9	Achnatherum nelsonii	Nelson's needlegrass
ACPI2	Achnatherum pinetorum	pine needlegrass
BRCA10	Bromopsis canadensis	fringed brome
BRPO5	Bromopsis porteri	nodding brome
BRJA	Bromus japonicus	Japanese brome
CAOB4	Carex obtusata	blunt sedge
DAPA2	Danthonia parryi	Parry oatgrass
ELTR7	Elymus trachycaulus	slender wheatgrass
FEAR2	Festuca arizonica	Arizona fescue
FEID	Festuca idahoensis	Idaho fescue
FESA	Festuca saximontana	Rocky Mountain fescue
FETH	Festuca thurberi	Thurber fescue
KOMA	Koeleria macrantha	prairie junegrass
MUFI	Muhlenbergia filiculmis	slimstem muhly
MUMO	Muhlenbergia montana	mountain muhly
POA	Poa	bluegrass
POFE	Poa fendleriana	muttongrass
POPR	Poa pratensis	Kentucky bluegrass



	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ADLE	Adenolinum lewisii	blue flax
ANRO2	Antennaria rosea	rose pussytoes
ASSP16	Aster spathulatus	western aster
ERFL	Erigeron flagellaris	trailing fleabane
ERSP4	Erigeron speciosus	Oregon fleabane
ERSU2	Erigeron subtrinervis	threenerve fleabane
ERVE2	Erigeron vetensis	early bluetop fleabane

ERUM	Eriogonum umbellatum	sulfur buckwheat
LAL2	Lathyrus leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
OXL3	Oxytropis lambertii	Lambert crazyweed
POEF	Potentilla effusa	Saskatchewan cinquefoil
POHI6	Potentilla hippiana	horse cinquefoil
SOSI3	Solidago simplex	Mt. Albert goldenrod



GA05. **THURBER-IDAHO FESCUES—DEEP COLD DARK SOILS (FETH/FEID)**. Thurber fescue/Idaho fescue—Deep Argic Cryoborolls, not coarse on surface—Linear to concave toeslopes and footslopes, 9,500-11,200 ft



NUMBER OF SAMPLES	12, soil descriptions from 5 of these (total 12)
ELEVATION	10,212 ft (9,500-11,120 ft); 3,112 m (2,895-3,389 m)
AVERAGE ASPECT	141°M (r = 0.59)
LITHOLOGY	Mostly tuff and basalt [75%], some sedimentaries or granite
FORMATIONS¹	Taf-Tbb-Tpl-Tmi [81%] or Km-PPm-Pmb [19%]
LANDFORMS	Predominantly soil creep slopes [55%] and slump-earthflows [18%]
SLOPE POSITIONS	Mostly toeslopes, footslopes, and lower backslopes [80%]
SLOPE SHAPES	Linear [64%] to undulating [18%] horizontally, Concave [64%] to linear [36%] vertically
SLOPE ANGLE	9.2% (2-31%)
SOIL PARENT MATERIAL	Mostly colluvium [64%] and a variety of others
COARSE FRAGMENTS	2.5% (0-9%) cover on surface, 44.5% (30-55%) by volume in soil
SOIL DEPTH	68 cm (41-116 cm); 26.6 in (16-46 in)
MOLLIC THICKNESS	45 cm (18-116 cm); 17.6 in (7-46 in)
TEXTURE	Loamy surface (loam-silty loam [86%]), subsurface is loamy (sandy clay loam-silty clay loam-sandy loam [57%]) to clayey (clay-clay loam-sandy clay [43%])
SOIL CLASSIFICATION	All Cryoborolls, mostly Pachic [89%]
TOTAL LIVE COVER	144.8% (89.5-217.6%)
NUMBER OF SPECIES	26.8 (18-34)
TOTAL LIVE COVER/NO. SPECIES	5.6% (3.5-11.7%)
CLIMATE	Outside rainshadow or in partial or deep rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine grassland.
WATER	Snowfall is considerable. Heavy layers of live vegetation and litter layers retain moisture. These sites may be adjacent to riparian areas.

#### Key to Community Types

1. Parry oatgrass conspicuous to abundant, >5% cover, often >25%. Idaho fescue >5% cover, often >10% ..... **A**
1. Parry oatgrass usually absent, rarely <1% cover. Idaho fescue absent or <15% cover ..... (2)
2. Thurber fescue dominant, >25% cover, often >40%. Total graminoid cover >75% ..... **B**
2. Thurber fescue absent to minor, 0-10% cover. Total graminoid cover <75%, often <50% ..... **C**

#### Description of Community Types

- A** *Parry oatgrass-Idaho fescue-Thurber fescue* is dominated by Parry oatgrass, 5-65% cover, Idaho fescue, 5-75% cover, and Thurber fescue, 5-25% cover. Total graminoid cover is 75-120%, and total live cover is 85-185%.
- B** *Thurber fescue-Idaho fescue* is dominated by Thurber fescue, 40-85% cover. Idaho fescue is a constant subdominant, 5-20% cover. Yarrow or slender wheatgrass (ELTR7) is sometimes abundant, >10% cover. Total graminoid cover is 90-120%, and total live cover is 100-220%.

- C *Sparse fescue-yarrow-beauty cinquefoil* usually has Idaho fescue or Thurber fescue sparse, <10% cover. The only constant is slender wheatgrass, 2-10% cover. Total graminoid cover is 50%, and total live cover is <120%.

Communities Not Assigned to a Community Type

- A community dominated by Kentucky bluegrass (POPR), elk sedge (CAGE2), and dry forbs such as silvery lupine (LUAR3), dandelion (TAOF), or beauty cinquefoil (POPU9). Thurber fescue is present in small amounts.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Parry oatgrass-Idaho fescue-Thurber fescue	10,545 (10,320-11,120) 10.8 (3-16)	49 (43-55) 57 (51-62) 28 (18-38)	4 (2-9) 17 (8-21) LS	1 (0-2) 0 (0-1) 94 (76-104) 39 (11-74)	28 (24-34) 133 (90-177) 4.7 (3.6-6.4)	0-11 2045-2757 25-874
B. Thurber fescue-Idaho fescue	9,936 (9,500-10,920) 10.6 (2-31)	41 (30-48) 84 (67-116) 57 (25-116)	1 (0-3) 21 (9-34) LM	0 (0-0) 5 (0-20) 110 (95-147) 60 (10-112)	25 (18-30) 175 (105-218) 7.2 (5.3-11.7)	0-458 2574-3056 24-1256
C. Sparse fescue-yarrow-dandelion-beauty cinquefoil	10,227 (9,700-10,920) 4.7 (2-9)	* 41 41	2 (1-5) 43 (30-60) EM	0 (0-0) 24 (0-72) 25 (14-43) 62 (27-95)	28 (26-30) 110 (106-116) 4.0 (3.5-4.3)	0-870 136-757 107-1133

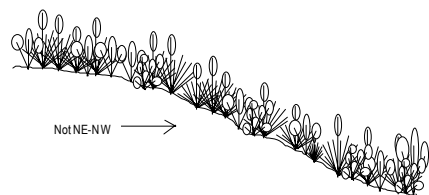
\*. Unknown: measurements were not taken in this CT.

	TREES	
PICO	Pinus contorta	lodgepole pine
	SHRUBS	
CHNA2	Chrysothamnus nauseosus	rubber rabbitbrush
CHPA13	Chrysothamnus parryi	Parry rabbitbrush
	GRAMINOIDS	
ACNE9	Achnatherum nelsonii	Nelson's needleglass
BRPO5	Bromopsis porteri	nodding brome
CAFE2	Carex festivella	ovalhead sedge
CAFO3	Carex foenea	silvertop sedge
CAGE2	Carex geyeri	elk sedge
CAOB4	Carex obtusata	blunt sedge
DAIN	Danthonia intermedia	timber oatgrass
DAPA2	Danthonia parryi	Parry oatgrass
DECE	Deschampsia cespitosa	tufted hairgrass
ELTR7	Elymus trachycaulus	slender wheatgrass
FEAR2	Festuca arizonica	Arizona fescue
FEID	Festuca idahoensis	Idaho fescue
FESA	Festuca saximontana	Rocky Mountain fescue
FETH	Festuca thurberi	Thurber fescue
KOMA	Koeleria macrantha	prairie junegrass
POFE	Poa fendleriana	muttongrass
POGL	Poa glauca	Greenland bluegrass
POPR	Poa pratensis	Kentucky bluegrass

	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ADLE	Adenolinum lewisii	blue flax
AGAU2	Agoseris aurantiaca	false-dandelion
AQCO	Aquilegia coerulea	Colorado columbine
ASAL7	Astragalus alpinus	alpine milkvetch
CEST3	Cerastium strictum	mouse-ear
CISC3	Cirsium scopulorum	Alpine thistle
DUHO	Dugaldia hoopesii	orange sneezeweed
ERIGE2	Erigeron	fleabane
ERFO3	Erigeron formosissimus	beautiful fleabane
ERVE2	Erigeron vetensis	early bluetop fleabane
ERTR19	Erythrocoma triflora	prairie smoke
FRVI	Fragaria virginiana	Virginia strawberry
FRSP	Frasera speciosa	monument plant
GASE6	Galium septentrionale	northern bedstraw
GERI	Geranium richardsonii	Richardson geranium
LAL2	Lathyrus leucanthus	aspen peavine
LUAR3	Lupinus argenteus	silvery lupine
MACA2	Machaeranthera canescens	hoary aster
OXSP	Oxytropis splendens	showy crazyweed
POAR11	Polygonum arenastrum	devil's shoestrings
POHI6	Potentilla hippiana	horse cinquefoil
POPU9	Potentilla pulcherrima	beauty cinquefoil
SEIN2	Senecio integerrimus	lamb's-tongue groundsel
SOMU	Solidago multiradiata	mountain goldenrod
SOSI3	Solidago simplex	Mt. Albert goldenrod
TAOF	Taraxacum officinale	common dandelion
TAOV	Taraxacum ovinum	rough dandelion
VACAA	Valeriana capitata ssp. acutiloba	sharpleaf valerian

# GA06. THURBER FESCUE/MOIST FORBS–DEEP DARK CLAY SOILS–LINEAR OR CONCAVE SLOPES

(FETH/THFE-VIAM-CAGE2). Thurber fescue/meadow-rue-vetch-elm sedge–Deep to very deep Argic Cryoborolls, sometimes Pachic, not coarse on surface–Linear to concave backslopes and footslopes, 8,700-11,300 ft



NUMBER OF SAMPLES	12, soil descriptions from 9 of these (total 12)
ELEVATION	10,024 ft (8,700-11,240 ft); 3,055 m (2,652-3,426 m)
AVERAGE ASPECT	140°M (r = 0.25)
LITHOLOGY	A wide variety of lithologies, including sedimentary sandstone-shale-mudstone-limestone [57%] and igneous granite-gneiss-schist-breccia-basalt-tuff [43%]
FORMATIONS'	A wide variety
LANDFORMS	Mostly soil creep slopes [58%] and slump-earthflows [25%]
SLOPE POSITIONS	Lower backslopes, footslopes, and toeslopes [69%]
SLOPE SHAPES	Linear [64%] to undulating [18%] horizontally, Concave [64%] to undulating [18%] vertically
SLOPE ANGLE	15.7% (4-30%)
SOIL PARENT MATERIAL	Mostly colluvium [73%], a variety of others
COARSE FRAGMENTS	2.0% (0-8%) cover on surface, 24.0% (1-53%) by volume in soil
SOIL DEPTH	101 cm (52-190 cm); 39.9 in (20-75 in)
MOLLIC THICKNESS	48 cm (18-94 cm); 19.0 in (7-37 in)
TEXTURE	Loamy surface (loam-clay loam-sandy loam [80%]), subsurface is clayey (clay loam-clay-silty clay-sandy clay [75%])
SOIL CLASSIFICATION	All Argic Cryoborolls, some Pachic [50%], deep [56%] to very deep [44%]
TOTAL LIVE COVER	221.5% (129.0-334.3%)
NUMBER OF SPECIES	30.7 (20-39)
TOTAL LIVE COVER/NO. SPECIES	7.5% (4.0-11.9%)
CLIMATE	Outside rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine grassland.
WATER	The sites get significant snowfall. Heavy layers of live vegetation and litter layers retain much moisture. These sites may be adjacent to riparian areas.

## Key to Community Types

1. Total forb cover >80%, often >95%. Total live cover >200%. Thurber fescue 40-100% cover ... (2)
1. Total forb cover <80%, often <60%. Total live cover <200%. Thurber fescue >70% cover ..... C
2. Thurber fescue <50% cover..... B
2. Thurber fescue >50% cover..... A

## Descriptions of Community Types

- A** *Thurber fescue-yarrow-vetch-valerian-meadow-rue* is dominated by Thurber fescue at 50-95% cover, with yarrow and moist-site forbs such as sharp-leaf valerian (VACAA), vetch (VIAM), osha (LIPO), Oregon fleabane (ERSP4), or aspen peavine (LALE2) conspicuous. Total forb cover is 90-190%.

- B** *Thurber fescue-elk sedge-slender wheatgrass-dense forbs* is dominated by Thurber fescue at 30-50% cover, with slender wheatgrass and elk sedge prominent at >15% each. Forbs such as those listed for CT A are also conspicuous. Total forb cover is 100-130%.
- C** *Thurber fescue-yarrow-forbs* is dominated by Thurber fescue at 60-95% cover, with less cover by forbs. Letterman needlegrass (ACLE9) is sometimes prominent at >20% cover.

Communities Not Assigned to a Community Type

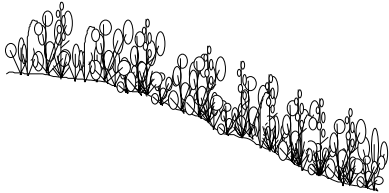
- One community was dominated by Thurber fescue, but included only minor amounts (<5%) of all other species. The sites is just below timberline, and the community has tufted hairgrass (DECE) and alpine fescue (FEBRC), so perhaps this community is related to *Tufted hairgrass/alpine avens* (Alpine type E) or *Timber oatgrass–Shallow soils–Exposed high ridges*.
- One community was dominated by elk sedge and dry-site to moist-site forbs. Thurber fescue was present in small amounts.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Thurber fescue-yarrow- vetch-valerian-meadow-rue	10,315 (9,800-11,240) 15.5 (4-30)	23 (1-53) 123 (56-190) 46 (18-60)	4 4 (2-20) LS	0 (0-0) 0 (0-2) 135 (109-153) 120 (96-181)	31 (24-38) 255 (216-334) 8.4 (5.7-11.5)	0-48 2827-3055 1138-1325
B. Thurber fescue-elk sedge-slender wheatgrass- dense forbs	10,420 11	31 65 25	1 10 LM	1 (0-2) 8 (0-16) 126 (116-136) 107 (105-109)	29 (20-37) 242 (238-245) 9.3 (6.6-11.9)	0-355 2919-3046 1212-1238
C. Thurber fescue-yarrow- forbs	9,489 (8,700-10,315) 17.2 (7-27)	24 (12-39) 78 (52-104) 60 (33-94)	1 (0-1) 8 (1-25) MS	0 (0-0) 6 (0-14) 125 (103-154) 31 (18-59)	31 (23-39) 161 (129-178) 5.4 (4.0-7.5)	0-330 2736-3050 42-630

	SHRUBS	
CHV18	Chrysothamnus viscidiflorus	Douglas rabbitbrush
MARE11	Mahonia repens	Oregon-grape
VAMY0	Vaccinium myrtillus ssp. oreophilum	Rocky Mountain whortleberry
	GRAMINOIDS	
ACLE9	Achnatherum lettermanii	Letterman needlegrass
BRCA10	Bromopsis canadensis	fringed brome
BRPO5	Bromopsis porteri	nodding brome
BRPU9	Bromopsis pumpelliana	Pumpelly brome
CAREX	Carex	sedge
CAFO3	Carex foenea	silvertop sedge
CAGE2	Carex geyeri	elk sedge
CAHO5	Carex hoodii	Hood sedge
DECE	Deschampsia cespitosa	tufted hairgrass
ELTR7	Elymus trachycaulus	slender wheatgrass
FETH	Festuca thurberi	Thurber fescue
HECO26	Hesperostipa comata	needle-and-thread
POFE	Poa fendleriana	muttongrass
PONE12	Poa nemoralis ssp. interior	interior bluegrass
PONE2	Poa nervosa	Wheeler bluegrass
TRSP2	Trisetum spicatum	spike trisetum
	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ADLE	Adenolinum lewisii	blue flax
AGAU2	Agoseris aurantiaca	false-dandelion
AGGL	Agoseris glauca	false-dandelion
ANRO2	Antennaria rosea	rose pussytoes
ASTER	Aster	aster
ASTRA	Astragalus	milkvetch
ASAL7	Astragalus alpinus	alpine milkvetch
CIRSI	Cirsium	thistle
DEBA2	Delphinium barbeyi	Barbey larkspur
DERA	Delphinium ramosum	mountain larkspur
DUHO	Dugaldia hoopesii	orange sneezeweed
ERCO24	Eremogone congesta	desert sandwort
ERSP4	Erigeron speciosus	Oregon fleabane
ERSU2	Erigeron subtrinervis	three-nerve fleabane
ERSU11	Eriogonum subalpinum	sulfurflower
ERTR19	Erythrocoma triflora	prairie smoke
FRVI	Fragaria virginiana	Virginia strawberry
GECA3	Geranium caespitosum	Fremont geranium
GERI	Geranium richardsonii	Richardson geranium
HEQU2	Helianthella quinquenervis	nodding helianthella
HEVI4	Heterotheca villosa	hairy golden aster
IRMI	Iris missouriensis	wild iris
LALE2	Lathyrus leucanthus	aspen peavine
LIPO	Ligusticum porteri	osha
LIGED	Linaria genistifolia ssp. dalmatica	Dalmatian toadflax
LUAR3	Lupinus argenteus	silvery lupine
ORAL	Oreoxis alpina	alpine-parsley
POHI6	Potentilla hippiana	horse cinquefoil
POPU9	Potentilla pulcherrima	beauty cinquefoil
SEIN2	Senecio integerrimus	lamb-tongue groundsel
SOMU	Solidago multiradiata	mountain goldenrod
TAOF	Taraxacum officinale	common dandelion
THFE	Thalictrum fendleri	Fendler meadow-rue
TRDA2	Trifolium dasyphyllum	whiproot clover
VACAA	Valeriana capitata ssp. acutiloba	sharp-leaf valerian
VIAM	Vicia americana	American vetch
FORB	forb unknown	unknown forb



GA07. **OSHA–VERY DEEP HEAVY-CLAY SOILS (LIPO/THFE)**. Osha/meadow-rue–Very deep Smectitic Cryoboralfs, not coarse on surface–Linear to concave slumps and earthflows, > 9,000 ft



NUMBER OF SAMPLES	6, soil descriptions from 3 of these (total 6)
ELEVATION	9,752 ft (9,100-10,100 ft); 2,972 m (2,774-3,078 m)
AVERAGE ASPECT	89°M (r = 0.70)
LITHOLOGY	Mostly sedimentary shale and claystone [86%], some granite
FORMATIONS'	Km [43%], Tmi [29%], others
LANDFORMS	Slump-earthflows [80%] and soil creep slopes [20%]
SLOPE POSITIONS	All backslopes
SLOPE SHAPES	Linear [75%] to undulating [25%] horizontally, Concave [75%] to linear [25%] vertically
SLOPE ANGLE	23.7% (5-40%)
SOIL PARENT MATERIAL	Colluvium [75%] or residuum [25%]
COARSE FRAGMENTS	4.2% (0-10%) cover on surface, 16.0% (4-25%) by volume in soil
SOIL DEPTH	89 cm (65-111 cm); 35.2 in (26-44 in)
MOLLIC THICKNESS	49 cm (3-78 cm); 19.2 in (1-31 in)
TEXTURE	Silty surface (silty clay loam-silty clay [75%], subsurface is clay [75%] or silty clay [25%])
SOIL CLASSIFICATION	All Cryoboralfs, very deep [67%] to deep [33%]
TOTAL LIVE COVER	203.5% (124.5-282.4%)
NUMBER OF SPECIES	24.3 (20-32)
TOTAL LIVE COVER/NO. SPECIES	8.5% (5.7-11.3%)
CLIMATE	Outside rainshadows. Cool to moderately cold, moist to moderately moist lower Subalpine forbland.
WATER	The sites get significant snowfall. Heavy layers of live vegetation and litter layers retain much moisture. These sites may sometimes be adjacent to riparian areas.

#### Key to Community Types

1. Osha (LIPO) conspicuous, >30% cover. Aspen peavine >15% cover..... **A**  
 1. Osha absent or <10% cover. Aspen peavine absent to <10% cover..... **B**

#### Description of Community Types

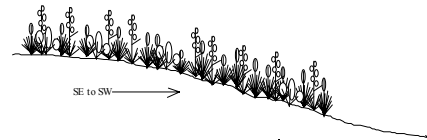
- A** *Osha-helianthella-peavine-meadow-rue-slender wheatgrass* has osha dominant or sharing dominance with other forbs, osha is 35-70% cover. Total forb cover is 150-220%.  
**B** *Mule's ears-false-hellebore-forbs* is dominated by a variety of dry forbs such as mule's ears (WYMA), desert sandwort (ERCO24), nodding helianthella (HEQU2), or false-hellebore (VETE4), Total forb cover is 401-170%.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Osha-helianthella-peavine-meadow-rue-slender wheatgrass	9,920 (9,900-9,940) 26.0 (22-30)	22 (19-25) 79 (65-92) 34 (3-65)	6 (3-10) 25 (23-27) LS	0 (0-0) 0 (0-0) 75 (69-80) 181 (160-203)	26 (21-30) 256 (229-282) 10.2 (9.4-10.9)	0-0 1829-2172 5198-5885
B. Mule's ears-false-hellebore-forbs	9,668 (9,100-10,100) 22.5 (5-40)	4 111 78	4 (1-7) 13 (2-20) MS-LM	0 (0-0) 4 (0-16) 47 (3-114) 126 (69-166)	24 (20-32) 177 (125-238) 7.7 (5.7-11.3)	0-82 30-2845 377-5409

	GRAMINOIDS	
ACPI2	Achnatherum pinetorum	pine needlegrass
BRSP2	Bromelica spectabilis	showy oniongrass
BRCA10	Bromopsis canadensis	fringed brome
BRPU9	Bromopsis pumpelliana	Pumpelly brome
CECA11	Ceratochloa carinata	mountain brome
ELTR7	Elymus trachycaulus	slender wheatgrass
FETH	Festuca thurberi	Thurber fescue
POPR	Poa pratensis	Kentucky bluegrass
PORE	Poa reflexa	nodding bluegrass
	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ACCO4	Aconitum columbianum	Columbian monkshood
CAGU	Calochortus gunnisonii	Gunnison mariposa
CIRSI	Cirsium	thistle
CICE	Cirsium centaureae	thistle
DEBA2	Delphinium barbeyi	Barbey larkspur
DUHO	Dugaldia hoopesii	orange sneezeweed
ERCO24	Eremogone congesta	desert sandwort
ERSP4	Erigeron speciosus	Oregon fleabane
ERRA3	Eriogonum racemosum	redroot buckwheat
ERTR19	Erythrocoma triflora	prairie smoke
FRVI	Fragaria virginiana	Virginia strawberry
GERI	Geranium richardsonii	Richardson geranium
HEQU2	Helianthella quinquenervis	nodding helianthella
HEMU3	Heliomeris multiflora	showy goldeneve
HESP6	Heracleum sphondylium	cow-parsnip
LAL2	Lathyrus leucanthus	aspen peavine
LIPO	Ligusticum porteri	osha
LUAR3	Lupinus argenteus	silvery lupine
MECI3	Mertensia ciliata	mountain bluebells
OSDE	Osmorhiza depauperata	sweet cicely
PHMU3	Phlox multiflora	flowery phlox
POPU9	Potentilla pulcherrima	beauty cinquefoil
SESE2	Senecio serra	butterweed groundsel
SETR	Senecio triangularis	arrowleaf groundsel
TAOF	Taraxacum officinale	common dandelion
THFE	Thalictrum fendleri	Fendler meadow-rue
VETE4	Veratrum tenuipetalum	Colorado false-hellebore
WYMA	Wyethia x magna	mule's ears
FORB	forb unknown	unknown forb



GA08. **IDAHO FESCUE–DEEP DARK CLAY SOILS, SHALLOW TO CLAY LAYER** (FEID/ELTR7). Idaho fescue/slender wheatgrass–Very deep Argic Cryoborolls, shallow to Argillic, not coarse on surface–Concave backslopes and footslopes, > 9,700 ft



NUMBER OF SAMPLES	4, soil descriptions from 1 of these (total 4)
ELEVATION	10,285 ft (9,720-10,810 ft); 3,135 m (2,963-3,295 m)
AVERAGE ASPECT	180°M (r = 0.80)
LITHOLOGY	Tuff [60%], basalt, and breccia
FORMATIONS¹	Taf [60%], Tbb, and Tpl, all Tertiary volcanics
LANDFORMS	Mostly soil creep slopes [75%]
SLOPE POSITIONS	Backslopes and footslopes
SLOPE SHAPES	Concave [50%] to linear [50%] horizontally, Concave [75%] to linear [25%] vertically
SLOPE ANGLE	2.2% (0-5%)
SOIL PARENT MATERIAL	Colluvium [75%] or alluvium [25%]
COARSE FRAGMENTS	4.5% (1-14%) cover on surface
SOIL DEPTH	94 cm; 37 in
MOLLIC THICKNESS	12 cm; 5 in
TEXTURE	Sandy loam surface, silty loam-sandy clay loam subsurface
SOIL CLASSIFICATION	All Argic Cryoborolls, very deep
TOTAL LIVE COVER	137.8% (85.8-174.1%)
NUMBER OF SPECIES	24.3 (20-32)
TOTAL LIVE COVER/NO. SPECIES	5.7% (4.3-7.2%)
CLIMATE	Cold, moderately dry grassland
WATER	Snowfall is considerable. Thin layers of live vegetation and litter layers retain some moisture

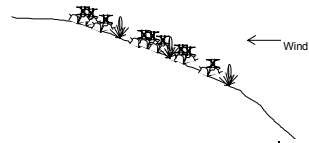
#### Community Type

- A *Idaho fescue-sparse slender wheatgrass-forbs* has Idaho fescue present to dominant, 4-95% cover. One plot is dominated by the grazing-increaser forb hairy golden aster (HEVI4), and one other plot is dominated by the exotic smooth brome (BRIN7), apparently invading into the site from a roadside seeded to this species. The other plots have a selection of dry to moist forbs under Idaho fescue.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod.¹, lb/ac/yr Shrubs Gramin. Forbs
A. Idaho fescue-sparse slender wheatgrass-forbs	10,285 (9,720-10,810) 2.2 (0-5)	30 94 12	5 (1-14) 22 (4-50)	0 (0-0) 1 (0-2) 78 (7-119) 59 (20-94)	24 (20-32) 138 (86-174) 5.7 (4.3-7.2)	0-34 68-2951 49-1122

	GRAMINOIDS	
ACLE9	<i>Achnatherum lettermanii</i>	Letterman needlegrass
BRIN7	<i>Bromopsis inermis</i>	smooth brome
ELTR7	<i>Elymus trachycaulus</i>	slender wheatgrass
FEID	<i>Festuca idahoensis</i>	Idaho fescue
KOMA	<i>Koeleria macrantha</i>	prairie junegrass
POFE	<i>Poa fendleriana</i>	muttongrass
POGL	<i>Poa glauca</i>	Greenland bluegrass
TRSP2	<i>Trisetum spicatum</i>	spike trisetum
	FORBS	
ACLA5	<i>Achillea lanulosa</i>	western yarrow
ANRO2	<i>Antennaria rosea</i>	rose pussytoes
ASAL7	<i>Astragalus alpinus</i>	alpine milkvetch
CEFO2	<i>Cerastium fontanum</i>	mouse-ear
CEST3	<i>Cerastium strictum</i>	mouse-ear
HEVI4	<i>Heterotheca villosa</i>	hairy golden aster
POHI6	<i>Potentilla hippiana</i>	horse cinquefoil
POPU9	<i>Potentilla pulcherrima</i>	beauty cinquefoil
PSMO	<i>Pseudocymopterus montanus</i>	mountain parsely
PYCL2	<i>Pyrrocoma clementis</i>	tranquil goldenweed
TAOF	<i>Taraxacum officinale</i>	common dandelion

GA09. **TIMBER OATGRASS–SHALLOW SOILS–EXPOSED HIGH RIDGES** (DAIN/DECE). Timber oatgrass/tufted hairgrass–Shallow Cryumbrepts and Cryoborolls–Windward, somewhat protected footslopes and toeslopes, > 10,500 ft



NUMBER OF SAMPLES	4, soil descriptions from none of these
ELEVATION	11,108 ft (10,580-11,960 ft); 3,385 m (3,225-3,645 m)
AVERAGE ASPECT	297°M (r = 0.79)
LITHOLOGY	Granite [50%], limestone, and rhyolite
FORMATIONS¹	A wide variety
LANDFORMS	Soil creep slopes [67%] or moraines [33%]
SLOPE POSITIONS	Footslopes and toeslopes [80%]
SLOPE SHAPES	Linear horizontally, Concave vertically
SLOPE ANGLE	3.9% (2-7%)
SOIL PARENT MATERIAL	Colluvial [67%] or glacial [33%]
COARSE FRAGMENTS	2.3% (2-3%) cover on surface
SOIL CLASSIFICATION	The sites as mapped were Cryumbrepts [67%] and Cryoborolls [33%]
TOTAL LIVE COVER	111.0% (93.0-125.6%)
NUMBER OF SPECIES	28.8 (22-38)
TOTAL LIVE COVER/NO. SPECIES	4.1% (2.4-5.7%)
CLIMATE	Cold to very cold, wind-exposed, upper Subalpine to lower Alpine.
WATER	Snow is moderately deep in winter, but blows off these sites early. The ground cover retains some little moisture through the growing season.

#### Community Type

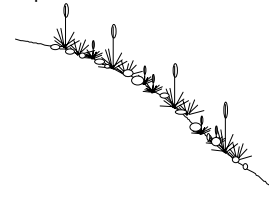
**A** *Timber oatgrass-tufted hairgrass-sparse* is usually dominated by timber oatgrass. 6-95% cover, often >10%. All plots have tufted hairgrass in small quantities 1-10% cover. One plot (the one with oatgrass 6%) is dominated by Baker's lupine (LUBAA), an upper-Subalpine short forb.

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Gramin. Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod.¹, lb/ac/yr Shrubs Gramin. Forbs
A. Timber oatgrass-tufted hairgrass-sparse	11,108 (10,580-11,960) 3.9 (2-7)	* 20 0	2 (2-3) 13 (5-30)	0 (0-0) 2 (0-4) 72 (51-95) 37 (20-65)	29 (22-38) 111 (93-126) 4.1 (2.4-5.7)	0-92 1074-2583 46-735

\*. Unknown: measurements were not taken in this CT.

GRAMINOIDS			FORBS	
ACLE9	Achnatherum lettermanii	Letterman needlegrass	ACLA5	Achillea lanulosa western yarrow
CAEB	Carex ebenea	ebony sedge	ARSC	Artemisia scopulorum alpine sagebrush
CAGE2	Carex geyeri	elk sedge	LUBAA	Lupinus bakeri Baker's lupine
DAIN	Danthonia intermedia	timber oatgrass		ssp. amplus
DECE	Deschampsia cespitosa	tufted hairgrass	ORAL	Oreoxis alpina alpine-parsley
ELTR7	Elymus trachycaulus	slender wheatgrass	POPU9	Potentilla pulcherrima beauty cinquefoil
FEID	Festuca idahoensis	Idaho fescue	SEIN2	Senecio integerrimus lambs-tongue groundsel
PHPR3	Phleum pratense	common timothy	SOMU	Solidago multiradiata mountain goldenrod
POFE	Poa fendleriana	muttongrass		
PONE12	Poa nemoralis ssp. interior	interior bluegrass		
TRSP2	Trisetum spicatum	spike trisetum		

GA10. **PURPLE PINEGRASS–SHALLOW ROCKY SOILS–EXPOSED HIGH RIDGES** (CAPU/ELSC4).  
 Purple pinegrass/Scribner wheatgrass–Moderately deep, gravelly and rocky residual Cryoborolls–Windward, exposed shoulders and summits of ridges, > 11,200 ft



NUMBER OF SAMPLES	3, soil descriptions from 1 of these (total 3)
ELEVATION	11,813 ft (11,200-12,380 ft); 3,601 m (3,414-3,773 m)
AVERAGE ASPECT	214°M (r = 0.51)
LITHOLOGY	Andesitic breccia and granite
FORMATIONS <sup>1</sup>	Tpl and Xg
LANDFORMS	Ridges
SLOPE POSITIONS	Shoulders and summits
SLOPE SHAPES	Convex to linear horizontally, Convex vertically
SLOPE ANGLE	21.8% (11-41%)
SOIL PARENT MATERIAL	Residuum
COARSE FRAGMENTS	42.0% (18-63%) cover on surface, 79% by volume in soil
SOIL DEPTH	35 cm (10-57 cm) = 13.8 in (4-22 in)
MOLLIC THICKNESS	22 cm (10-38 cm) = 8.7 in (4-15 in)
TEXTURE	Sandy loam-sandy clay loam on surface, subsurface is loamy sand
SOIL CLASSIFICATION	Cryoborolls, moderately deep
TOTAL LIVE COVER	94.1% (71.0-124.6%). No. Species = 28.3 (25-30)
TOTAL LIVE COVER/NO. SPECIES	3.4% (2.4-5.0%)
CLIMATE	Cold to very cold, wind-exposed, upper Subalpine to lower Alpine.
WATER	Snow blows off these sites continually through the winter and early in the spring. The ground cover retains a little moisture through the growing season.

#### Community Type

**A** *Purple pinegrass-alpine fescue-tufted hairgrass* is dominated by purple pinegrass, a large grass in this environment. Other constant species include Scribner wheatgrass, alpine fescue, and desert sandwort (ERFE3).

Community Type	Elevation, ft Slope, %	Coarseness, % Depth, cm Mollic Depth, cm	Surface Coarse, % Bare, % Seral Stage	Cover, %: Trees Shrubs Graminoids Forbs	No. Species Total Live Cover, % TLC/NS, %	Prod. <sup>1</sup> , lb/ac/yr Shrubs Gramin. Forbs
A. Purple pinegrass-sparse alpine fescue-sparse tufted hairgrass	11,813 (11,200-12,380) 21.8 (11-41)	79 (79-79) 35 (10-57) 22 (10-38)	42 (18-63) 5 (4-5)	0 (0-0) 0 (0-0) 65 (43-90) 29 (24-34)	28 (25-30) 94 (71-125) 3.4 (2.4-5.0)	0-0 757-2464 80-205

	GRAMINOIDS	
CAPU	Calamagrostis purpurascens	purple pinegrass
CAFO3	Carex foenea	silvertop sedge
CAPE7	Carex petasata	Liddon sedge
FEBC	Festuca brachyphylla ssp. coloradensis	alpine fescue
HEMO3	Helictotrichon mortonianum	alpine oat
POCU3	Poa cusickii	bluegrass
POGL	Poa glauca	Greenland bluegrass
POJU	Poa juncifolia	alkali bluegrass

	FORBS	
ACLA5	Achillea lanulosa	western yarrow
ARSC	Artemisia scopulorum	alpine sagebrush
ERFE3	Eremogone fendleri	desert sandwort
ERCO4	Erigeron compositus	fernleaf fleabane
HEPA11	Heuchera parvifolia	littleleaf alumroot
PAPU2	Paronychia pulvinata	Rocky Mtn. nailwort
PONI2	Potentilla nivea	snow cinquefoil
SEDE2	Selaginella densa	little club-moss
TRDA2	Trifolium dasyphyllum	whiproot clover
TRNA2	Trifolium nanum	dwarf clover